Claims

1. An apparatus for delivery and deployment of an expandable stent (2; 102; 202) within a vessel, the apparatus comprising:

   (a) a catheter having a proximal end and a distal end,

   (b) an expandable means (3; 103; 203) mounted at the distal end of the catheter and being expandable by means of a fluid pressure device (10, 12-14; 110, 113-115; 210, 213, 214, 216),

   (c) the expandable stent (2; 102; 202) being expandable from a delivery diameter to a deployment diameter and being mounted on the catheter over the expandable means (3; 103; 203),

   (d) a sheath (1; 101; 201) being slidably mounted on the stent (2; 102; 202) and being arranged for proximal retraction to expose the stent (2; 102; 202) by means of a retraction device (4-9, 11, 13-15; 104, 105, 113-115; 204, 211, 213-215), wherein

   (e) the fluid pressure device (10, 13-14; 110, 113-115; 210, 213, 214, 216) is further arranged for operating the retraction device (4-9, 11, 13-15; 104, 105, 113-115; 204, 211, 213-215) so that the expandable means (3; 103; 203) is expanded in response to the retraction of the sheath (1; 101; 201).

2. The apparatus according to claim 1, wherein the retraction device comprises a cylinder-piston arrangement (5, 7, 9, 15; 105, 115; 205, 207, 215) operated by the fluid pressure.

3. The apparatus according to claim 1 or 2, comprising a control means (7, 5, 11, 12; 105, 112; 205, 211, 212, 207) for controlling the fluid pressure operating the retraction device and the expandable means, either concurrently or sequentially.

4. The apparatus according to claim 2 or 3, wherein a first piston (5; 105; 205) of the cylinder-piston arrangement (5, 7, 15; 105, 115; 205, 207, 215) is connected to the sheath (101; 201) via a wire (4; 104; 204).

5. The apparatus according to any of claims 2 to 4, wherein the cylinder-piston arrangement (5, 7, 15; 105, 115) comprises an outlet (17; 110a) connected to a fluid pressure line (16, 10; 110) for applying the fluid pressure to the expandable means (3; 103).

6. The apparatus according to claim 5, wherein the cylinder-piston arrangement (5, 7, 15) comprises a floating second piston (7) for controlling the opening/closing of the outlet (17).

7. The apparatus according to claim 5 or 6, wherein during retraction of the sheath (1) either the first piston (5) or the second piston (7) close the outlet (17), and after at least partial retraction of the sheath (1) the first and second pistons (5, 7) are in a position at the proximal end of the cylinder (15) and the outlet (17) is open.

8. The apparatus according to claim 7, wherein the first piston (5) comprises a hook (6), the second piston (7) comprises a first central opening (18), the cylinder (15) comprises a second opening (19) and a hook holder (8) at its proximal end, so that during retraction of the sheath (1) the shifting first piston (5) moves the hook (6) through the first opening (18) and the second opening (19) until the hook (6) engages the hook holder (8).

9. The apparatus according to claim 5, wherein the first piston arrangement (105) comprises a connector means (106) and the cylinder (115) comprises at its proximal end a receiving means (108) for the connector means (106), so that after retraction of the sheath (101) the connector means (106) engages the receiving means (108) and the outlet (110a) is in connection with the fluid pressure acting on the first piston (105).

10. The apparatus according to claim 4, wherein the cylinder-piston arrangement comprises the first piston (205) and a two-position valve (207) abutting via a spring

(207a) at the proximal end (215b) of the cylinder (215), wherein

in a closed position the valve (207) shuts by the spring force channels (216a, 216b) penetrating the wall of the cylinder (215), and

in an open position, the valve (207) opens the channels (216a, 216b) after it is pushed by the piston (205) when the sheath (201) is retracted and connects a fluid pressure line (214) from the fluid pressure device (213) with a fluid pressure line (210) so that the fluid pressure is applied to the expandable means (203).

11. Apparatus according to any of claims 1 to 10, wherein the fluid is liquid.